

# NOTES ON CULICIDAE COLLECTED IN VENEZUELA

BY

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## PLATES XXV AND XXVI

During the course of the investigations in Venezuela, recorded in the foregoing paper, a number of mosquitoes were collected by Professor Stephens at Mene Grande, which is situated about ten miles inland from Lake Maracaibo. Specimens were also caught at Maracay near Lake Valencia, which is separated from Lake Maracaibo by a range of mountains, and on the Island of Curaçao. The following is a list of the species collected at each of the three places:—

## LAKE MARACAIBO

*Anopheles argyrotarsis*, R.D.

Hatched from larvae taken in swamp ♂♂ 3, ♀♀ 6. Mene Grande,  
22.8.21, ♀♀ 5.

*Aedes serratus*, Theo.

Mene Grande, 3.8.21, ♀♀ 6. Biting in jungle, Mene Grande,  
5.8.21, ♀♀ 6. Caught in jungle, biting horse and man,  
5.8.21, ♀ 1; 11.8.21, ♀♀ 11.

*Aedes scapularis*, Rond.

Mene Grande, jungle, 11.8.21, ♀♀ 3.

*Taeniorhynchus titillans*, Walk.

Mene Grande, biting in jungle, ♀♀ 3.

*Culex (Neomelanoconion) chrysothorax*, Newstead and Thomas.

Reared from pupa taken in swamp, Mene Grande, 7.8.21, ♀ 1.

\**Culex (Culex) coronator*, D. and K.

Mene Grande, 6.8.21, ♂♂ 4, ♀♀ 6. Hatched from larvae, Mene Grande, 1.8.21, ♂♂ 2; 11.8.21, ♀♀ 2; ♂♂ 3, ♀ 1.

\**Culex (Culex) nigripalpus*, Theo.

Mene Grande, ♂ 1.

*Psorophora posticata*, Wied.

Mene Grande, 11.8.21, ♀♀ 2.

*Joblotia digitatus*, Rond.

Jungle, Mene Grande (about 20 miles inland from Lake Maracaibo), 20.8.21, ♀♀ 2.

## MARACAY

(about 10 miles from Lake Valencia)

*Anopheles argyrotarsis*, R.D.

Maracay outskirts, 8.9.21, ♀ 1.

*Anopheles albimanus*, Wied.

Maracay outskirts, 8.9.21, ♂ 1, ♀ 1.

*Anopheles albimanus var. tarsimaculatus*, Goeldi.

Maracay outskirts, 8.9.21, ♂ 1, ♀ 1. Maracay outskirts, 5 specimens.

*Anopheles pseudopunctipennis*, Theo.

Maracay outskirts, 7 specimens.

*Aedes scapularis*, Rond.

Maracay outskirts, 8.9.21, ♀ 1.

*Aedes trivittatus*, Coq.

8.9.21, ♀♀ 2.

\**Culex (Culex) quinquefasciatus*, Say.

Maracay outskirts, 8.9.21, ♂♂ 3.

\**Culex (Culex) virgultus*, Theo.

Maracay outskirts, 8.9.21, ♂ 1.

*Psorophora posticata*, Wied.

Maracay outskirts, 8.9.21, ♀ 1.

\* Determined by the male genitalia (See Dyar, 1918).

## CURAÇAO

*Aedes (Stegomyia) fasciata*, Fabr.

Breeding in tub, Ice Factory, Curaçao, I.9.2I, ♀ I.

\**Culex (Culex) quinquefasciatus*, Say.

From larvae breeding in tub of ice manufacturer, 30.8.2I.

♂ ♂ 9, ♀ ♀ II; I-2.9.2I, ♂ ♂ I4, ♀ ♀ 3I.

**THE MORPHOLOGICAL CHARACTERS OF  
ANOPHELES ARGYROTARSIS, R.D., AND A. ALBIMANUS, WEID.**

*Larvae.* In their Monograph, Howard, Dyar and Knab (1917), state that palmate hairs occur only on abdominal segments two to seven in *A. argyrotarsis*, but that in *A. albimanus* there is an additional small pair on the first abdominal segment. The larvae of *A. argyrotarsis*, which Professor Stephens collected from the swamps around Mene Grande, however, all possessed these structures on the first segment of the abdomen. In some specimens these were in a reduced and incomplete condition, but in a certain number they were well developed, and in these latter specimens a pair of palmate hairs was also present on the thorax, a position in which they do not appear to have been recorded hitherto in either of these species. The distribution of these structures is thus shewn to be variable in the two species, and cannot be used as a specific character for determination of the larvae.

*Male hypopygium.* In view of the close resemblance between the adults of these species, it appeared desirable to compare the detailed structure of the male hypopygium. The figures in the Monograph of Howard, Dyar and Knab (1912) tend to exaggerate the differences present, and it is obvious that the morphology was not clearly understood. Christophers (1915) described the hypopygium of *A. albimanus*, and placed in one group with this species *A. argyrotarsis*, *A. tarsimaculata*, and *A. bellator*. This group was based on the number and arrangement of the large spines arising from the side-piece, but Christophers stated that it was imperfectly studied. Edwards (1920) referred to the structure of the *mesosome* (theca) of *A. argyrotarsis*, saying that it approached nearest to the simple form seen in *Ochlerotatus*.

\*Determined by the male genitalia (see Dyar, 1918).

Before comparing the hypopygium of the two species, it is necessary briefly to discuss the structure of certain of the constituent parts. The nomenclature employed is that proposed by Edwards (1920). The *mesosome* (theca) of *A. albimanus* has been described and figured as 'massive and clubbed.' This appears to have been due to confusion of the mesosome with a wide median membraneous lobe (fig. 2 A and B, *m.l.*) which arises from the membrane at the base of the side-pieces on their upper (by rotation) sides. The position of

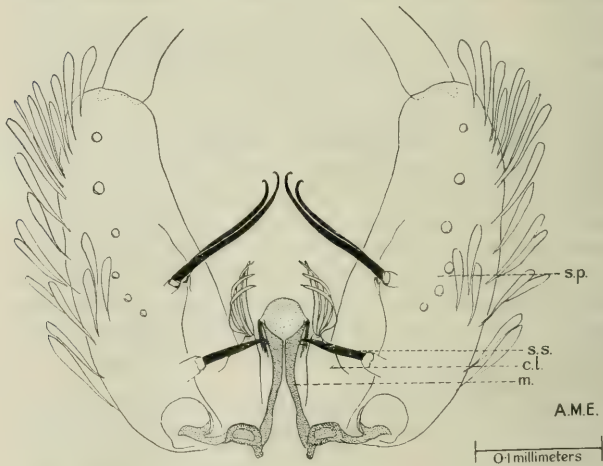


FIG. 1. ♂ Hypopygium of *A. argyrotarsis* from below; tenth sternite not shown. *cl.*, claspette; *m.*, mesosome; *s.p.*, side-piece; *s.s.*, stalked spine.

this lobe in relation to the side-pieces is shown in the drawings (fig. 2 A and B). Distally it becomes bilobed, and the two halves are produced downwards (towards the tenth sternites) so as to embrace the distal half of the mesosome. So intimately are the distal portions of the lobe associated with the mesosome, that in mounted preparations it is often impossible to distinguish the separate structures. When examined floating in oil under a binocular microscope, however, and arranged so that a terminal view

is obtained the mesosome can be seen lying ensheathed on three sides by the median lobe, and its downward processes. The separate parts can then be dissected away and isolated. The form of the mesosome and median lobe afford what appear to be reliable

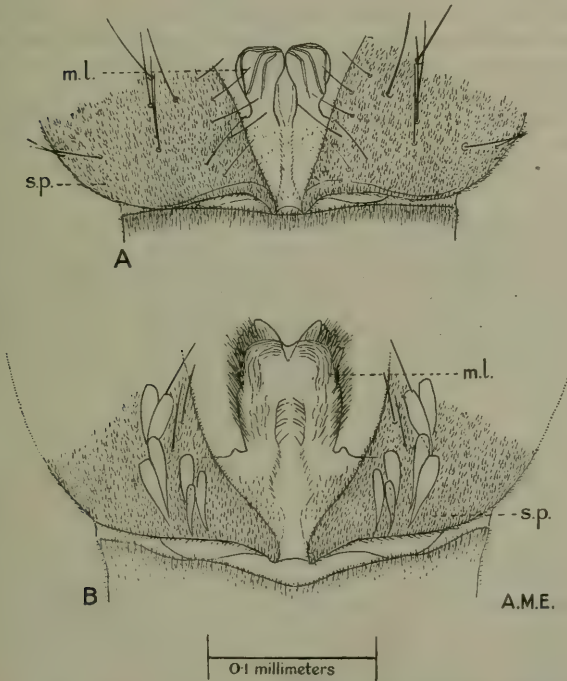


FIG. 2. Base of ♂ Hypopygium from above; mesosome and tenth sternite not shown; drawn from specimens macerated in K.O.H. A—*A. argyrotarsis*. B—*A. albimanus* var. *tarsimaculata*. m.l., median lobe; s.p., side-piece.

characters for the separation of the species *A. argyrotarsis* and *A. albimanus*. The latter species and its variety *tarsimaculata* appeared not to differ to any marked degree in the characters of the hypopygium.

*The Mesosome* (fig. 3 A and B). It was found that the mesosome can be best studied in specimens stained with carbol fuchsin. In both species the halves of the mesosome are elongate plates, each articulating basally with the chitinous pieces (*p.b.p.*), which represent the parameres and basal plates of other Culicidae. The halves (*h*) approach each other on the upper side, but below are connected by thin membrane which distally becomes chitinised, forming a rounded apical plate (*a.p.*) concave above, and membranous at its margin.

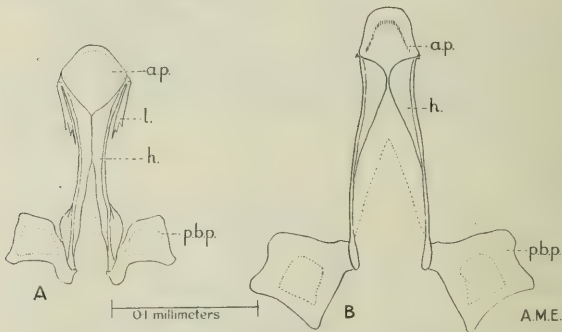


FIG. 3. Mesosome; drawn from specimens stained with carbol fuchsin. A—*A. argyrotarsis*. B—*A. albimanus* var. *tarsimaculata*. *a.p.*, apical plate; *b.*, half of mesosome; *l.*, leaflet; *p.b.p.*, plate representing parameres and basal plates.

In *A. argyrotarsis* the halves of the mesosome may be actually contiguous for part of their length, causing the mesosome to be tubular in this region. At the distal extremity of each half arises a flat recurved spine (*l.*), toothed on its outer side, which is obviously equivalent to the *leaflets* of the more specialised Anophelini. Although the leaflets of other species are usually directed more or less distally, Swellengrebel (1921) figures some recurved ones in *A. (Myzorhynchus) barbirostris*, v. d. Wulp var. *pallidus*, Sw., and in *A. (Myzorhynchus) umbrosus*, Theo. The greatest breadth of the apical plate is greater than its height above the apices of the halves of the mesosome.

In *A. albimanus* and its variety *tarsimaculata*, the halves of the mesosome (fig. 3 B) have only a slight tendency to form a tube. Leaflets are absent, and the greatest breadth of the apical plate is

equal to or less than its height above the apices of the halves of the mesosome.

*The Median lobe.* In *A. argyrotarsis* (fig. 2 A), the distal portions of this structure are composed of a number of parallel divisions, the exact form of which is exceedingly difficult to determine in macerated specimens, owing to the extreme thinness of the membrane, and its liability to distortion. There are no long hairs or setae present. In *A. albimanus* and its variety (fig. 2 B), the surface of the median lobe is thrown into a large number of shallow folds distally, these folds involving the lateral descending portion as well as the upper surface. The sides are thickly clothed with long hairs, and a number of very delicate hairs occur on the surface of the basal portion of the median lobe.

*Side-pieces.* No well marked specific characters could be found in the large spines borne on the internal surface of the side-pieces. The pedicels of the stalked spines (fig. 1, *s.s.*) are slightly shorter in *A. argyrotarsis* than in *A. albimanus*. The *claspettes* are in the former species broad and not well differentiated from the surface of the side-piece. In this they differ from the separate finger-like condition in which they sometimes occur in *A. albimanus* (Christophers, 1915). In some specimens of the latter species, however, they occur in the same condition as in *A. argyrotarsis*.

The *tenth sternite* is almost identical in the two species. The appearance varies according to the position of the paired chitinous arms.

The main differences, then, between the male hypopygium of *A. argyrotarsis* and *A. albimanus* lie in the form of the mesosome and the membraneous structure here referred to as the median lobe. The character of the mesosome of *A. argyrotarsis*, with its single pair of leaflets and tendency to form a complete tube, suggests a transitional stage between the generalised condition seen in *A. albimanus* and the completely tubular form with numerous leaflets which occur in most species of the genus.

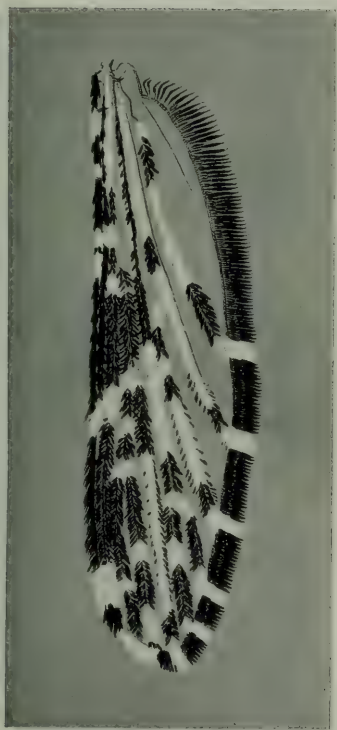
#### REFERENCES

- CHRISTOPHERS (1915). *Ind. Journ. Med. Res.* Vol. III, p. 379.  
 DYAR (1918). *Ins. Ins. Mens.* Vol. VI, p. 94. Plates III and IV.  
 EDWARDS (1920). *Ann. Trop. Med. & Parasitol.* Vol. XIV, p. 23.  
 HOWARD, DYAR and KNAB (1912), (1917). Mosquitoes of North and South America and the West Indies. Vol. II, Figs. 258, 263, 264. Vol. IV, Table on p. 967.  
 SWELLENGREBEL (1921). *Overged. u.b. Tijds. v. Ent.*, Deel LXIV, 1921, pp. 39, 40.

## EXPLANATION OF PLATE XXV

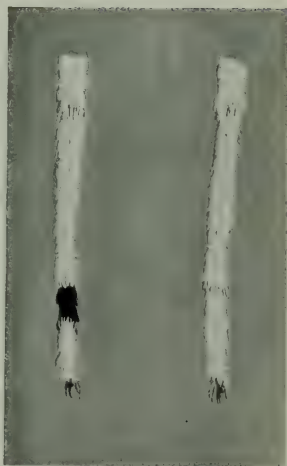
- Fig. 1. Wing of *Anopheles albimanus* var. *tarsimaculata*.
- Fig. 2. End of hind tarsus of *A. albimanus* var. *tarsimaculata*.
- Fig. 3. End of hind tarsus of *A. argyrotarsis*.





1 millimeter

FIG. 1



0.5 millimeter

FIG. 2

FIG. 3

## EXPLANATION OF PLATE XXVI

Fig. 1. Wing of *Anopheles punctipennis*.

Fig. 2. Wing of *A. pseudopunctipennis*.



FIG. 1

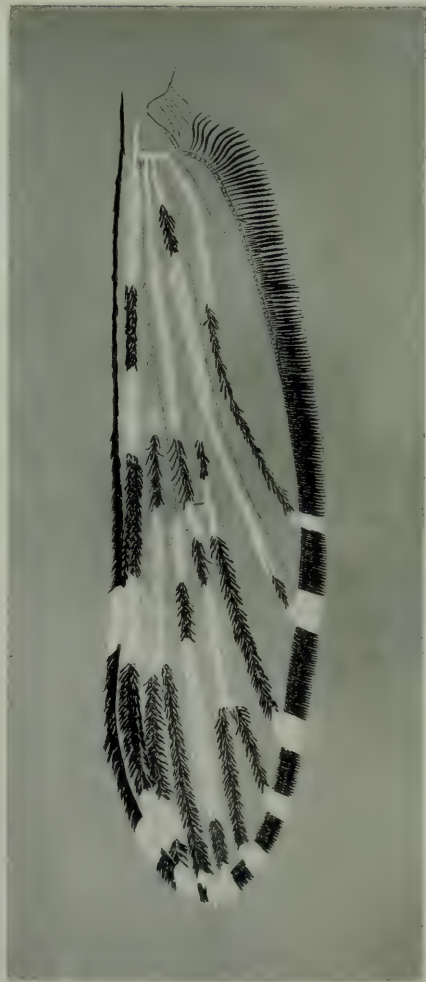


FIG. 2

1 millimeter

